

*March 2005*

***Application to the  
Minnesota Environmental  
Quality Board  
for a Route Permit***

**MINNKOTA POWER COOPERATIVE, INC.**

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**Lund Substation and  
230 kV Line Tap Project  
Lake of the Woods County, MN**

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**Alternative Permitting Process  
EQB Docket No. 05-93-TR Minnkota**



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**List of Acronyms and Abbreviations**

ACSR	Aluminum conductor steel reinforced
APE	Area of Potential Effects
BMP	best management practice
BPA	Bonneville Power Administration
CON	Certificate of Need
dB	Decibels
dBA	A-weighted sound level recorded in units of decibels
DNR	Minnesota Department of Natural Resources
EMF	electromagnetic field
EPA	Environmental Protection Agency
EQB	Minnesota Environmental Quality Board
FAA	Federal Aviation Administration
HVTL	high voltage transmission line
Hz	Hertz
kV	Kilovolt
MDH	Minnesota Department of Health
MLCCS	Minnesota Land Cover Classification System
MNDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
MVA	Megavolt ampere
MW	megawatt
NAC	noise area classification
NERC	North American Electric Reliability Council
NESC	National Electrical Safety Code
NEV	Neutral-to-earth voltage
NIEHS	National Institute of Environmental Health Sciences
NPDES	National Pollution Discharge Elimination System
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
PEMC	Palustrine, Emergent, Seasonally Flooded
PFOC	Palustrine, Forested, Seasonally Flooded
ppm	parts per million
PUC	Public Utilities Commission
PWA	Public Water Access
PWI	Public Waters Inventory
ROW	Right-of-Way
RUS	Rural Utility Service
SHPO	State Historic Preservation Office
SPCC	Spill Prevention, Control and Countermeasure
SWPPP	Stormwater pollution prevention plan
USDOE	United States Department of Energy

USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WMA	Wildlife Management Area

## **1.0 PROJECT SUMMARY**

Minnkota Power Cooperative (Minnkota), submits this application for a Route Permit to the Minnesota Environmental Quality Board (EQB) pursuant to Minnesota Rules Chapter 4400 and Minnesota Statutes Chapter 116C. The permit is requested for the following facility improvements, collectively “the Lund Substation and 230 kV Line Tap Project” or “the Project,” which include:

- A new 3.6-acre 230/69 kV substation,
- Two new 0.5 mile long single circuit 230 kV transmission lines,
- A new 0.1 mile long 69 kV transmission line,
- Replacement of 1.5 miles of the Warroad to Littlefork 69 kV transmission line with 1.5 miles of a double circuit 69 kV transmission line
- Installation of 1.2 miles of buried fiber optic cable
- And removal of an existing tap switch (Spoonier Switch)

The Project is necessary to meet the needs of its member distribution cooperatives.

### **1.1 ELIGIBILITY FOR THE ALTERNATIVE PERMITTING PROCESS**

The EQB rules provide for an Alternative Permitting Process for eligible projects (Minnesota Rule 4400.2000, Subpart 1.(A.)-(G.)). The Project includes two 69 kV transmission lines and two 230 kV transmission lines. The two 69 kV transmission lines do not meet the definition of a high voltage transmission line (HVTL) as defined in Minnesota Rule 4400.0200, Subpart 8. The 230 kV transmission lines qualify for the Alternative Permitting Process because they meet Minnesota Rule 4400.2000, Subpart 1.(D.) (HVTL is in excess of 200 kV, and the line is less than five miles in length in Minnesota). The EQB submittal requirements are listed on Table 1 with cross-references indicating where information can be found elsewhere in this application.

### **1.2 CERTIFICATE OF NEED REQUIREMENTS**

The Minnesota Statute §216B.243, Subd. 2 states that no large energy facility shall be sited or constructed in Minnesota without the issuance of a Certificate of Need (CON) by the Public Utilities Commission. The 230 kV transmission lines proposed for the Project qualify as a “large energy facility” per Minn. Stat. §216B.2421, Subd. 2(2). However, the project qualifies for an exemption since the Project is a HVTL of one mile or less that is required to connect a new substation to an existing HVTL (Minn. Stat. §216B.243, Subd. 8(4)).

**Table 1**  
**Completeness Checklist**

<b>Authority</b>	<b>Required Information</b>	<b>Where</b>
4400.1150, Subp. 2 Required per 4400.2100	<b>Site Permit for LEPGP</b> A. a statement of proposed ownership of the facility at the time of filing the application and after commercial operation	2.2
	B. the precise name of any person or organization to be initially named as permittee or permittees and the name of any other person to whom the permit may be transferred if transfer of the permit is contemplated	2.3
	C. at least two proposed routes for the proposed high voltage transmission line and identification of the applicant's preferred route and the reasons for the preference	Not applicable, per 4400.2100
	D. a description of the proposed high voltage transmission line and all associated facilities including the size and type of the high voltage transmission line	2.5, 3.2, 3.3, 3.4
	E. the environmental information required under 4400.1150, Subp. 3	See 4400.1150, Subp. 3 (A)-(H) Below
	F. identification of land uses and environmental conditions along the proposed routes	4.1
	G. the names of each owner whose property is within any of the proposed routes for the high voltage transmission line	5.2
	H. United States Geological Survey topographical maps or other maps acceptable to the chair showing the entire length of the high voltage transmission line on all proposed routes	Appendix B
	I. identification of existing utility and public rights-of-way along or parallel to the proposed routes that have the potential to share right-of-way with the proposed line	3.2.3
	J. the engineering and operational design concepts for the proposed high voltage transmission line, including information on the electric and magnetic fields of the transmission line	3.2; 3.5
	K. cost analysis of each route, including the costs of constructing, operating, and maintaining the high voltage transmission line that are dependent on design and route	2.8
	L. a description of possible design options to accommodate expansion of the high voltage transmission line in the future	3.2.2

Authority	Required Information	Where
	M. the procedures and practices proposed for the acquisition and restoration of the right-of-way, construction, and maintenance of the high voltage transmission line	3.3
	N. a listing and brief description of federal, state, and local permits that may be required for the proposed high voltage transmission line	5.3
	O. a copy of the Certificate of Need or the certified HVTL list containing the proposed high voltage transmission line or documentation that an application for a Certificate of Need has been submitted or is not required	1.2
4400.1150, Subp. 3	<b>Environmental Information</b>	4.1
	A. a description of the environmental setting for each site or route	
	B. a description of the effects of construction and operation of the facility on human settlement, including, but not limited to, public health and safety, displacement, noise, aesthetics, socioeconomic impacts, cultural values, recreation, and public services	4.2
	C. a description of the effects of the facility on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining	4.3
	D. a description of the effects of the facility on archaeological and historic resources	4.4
	E. a description of the effects of the facility on the natural environment, including effects on air and water quality resources and flora and fauna	4.5
	F. a description of the effects of the facility on rare and unique natural resources	4.6
	G. identification of human and natural environmental effects that cannot be avoided if the facility is approved at a specific site or route	All of Section 4 in "Potential Impacts"
	H. a description of measures that might be implemented to mitigate the potential human and environmental impacts identified in items A to G and the estimated costs of such mitigative measures	All of Section 4 in "Mitigative Measures"
4400.1350, Subp. 2 (Applicable to Alternative Permitting Process Per 4400.2300)	<b>Notice of Project</b>  Subpart 2. Notification to persons on general list, to local officials, and to property owners	Will be submitted within 15 days of application submission

Authority	Required Information	Where
4400.2000, Subp. 1(C) and Subp. 2.	Subpart 1. <b>Eligible Projects.</b> An applicant for a site permit or a route permit for one of the following projects may elect to follow the procedures of parts 4400.2000 to 4400.2950 instead of the full permitting procedures in parts 4400.1025 to 4400.1900: high voltage transmission lines of between 100 and 200 kilovolts	1.1
	Subpart 2. <b>Notice to EQB.</b> An applicant for a permit for one of the qualifying projects in subpart 1, who intends to follow the procedures of parts 4400.2000 to 4400.2750, shall notify the EQB of such intent, in writing, at least ten days before submitting an application for the project	Appendix A
4400.2100	<b>Contents of Application</b> (alternative permitting process) The applicant shall include in the application the same information required in part 4400.1150, except the applicant need not propose any alternative sites or routes to the preferred site or route. If the applicant has rejected alternative sites or routes, the applicant shall include in the application the identity of the rejected sites or routes and an explanation of the reasons for rejecting them	See also 4400.1150, Subp.2 above
4400.3150	<b>Factors Considered</b> A. effects on human settlement, including, but not limited to, displacement, noise, aesthetics, cultural values, recreation, and public services	6.1
	B. effects on public health and safety	6.2
	C. effects on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining	6.3
	D. effects on archaeological and historic resources	6.4
	E. effects on the natural environment, including effects on air and water quality resources and flora and fauna	6.5
	F. effects on rare and unique natural resources	6.6
	G. application of design options that maximize energy efficiencies, mitigate adverse environmental effects, and could accommodate expansion of transmission or generating capacity	6.7
	H. use or paralleling of existing rights-of-way, survey lines, natural division lines, and agricultural field boundaries	6.8
	I. use of existing large electric power generating plant sites	6.9 (not applicable)

Authority	Required Information	Where
	J. use of existing transportation, pipeline, and electrical transmission systems or rights-of-way	6.10
	K. electrical system reliability	6.11
	L. costs of constructing, operating, and maintaining the facility which are dependent on design and route	6.12 (not applicable)
	M. adverse human and natural environmental effects which cannot be avoided	6.13
	N. irreversible and irretrievable commitments of resources	6.14
4400.3350, Subps. 1 and 2	Subpart 1. <b>Wilderness areas.</b> No high voltage transmission line may be routed through state or national wilderness areas  Subpart 2. <b>Parks and natural areas.</b> No high voltage transmission line may be routed through state or national parks or state scientific and natural areas unless the transmission line would not materially damage or impair the purpose for which the area was designated and no feasible and prudent alternative exists. Economic considerations alone do not justify use of these areas for a high voltage transmission line	Not Applicable
4400.3450	<b>Prohibited Sites</b>	Not Applicable
Minn. Stat. §116C.57, Subd. 4 (applicable per Minn. Stat. §116C.575, Subd. 8)	<b>Considerations in designating sites and routes</b>  (1) Evaluation of research and investigations relating to the effects on land, water and air resources of large electric power generating plants and high voltage transmission lines and the effects of water and air discharges and electric and magnetic fields resulting from such facilities on public health and welfare, vegetation, animals, materials and aesthetic values, including base line studies, predictive modeling, and evaluation of new or improved methods for minimizing adverse impacts of water and air discharges and other matters pertaining to the effects of power plants on the water and air environment	2.6; 3.5; 4.1-4.6; 6.1-6.3, 6.5, 6.6
	(2) Environmental evaluation of sites and routes proposed for future development and expansion and their relationship to the land, water, air and human resources of the state	3.2.2, 6.7
	(3) Evaluation of the effects of new electric power generation and transmission technologies and systems related to power plants designed to minimize adverse environmental effects	Not applicable
	(4) Evaluation of the potential for beneficial uses of waste energy from proposed large electric power generating plants	Not applicable

Authority	Required Information	Where
	(5) Analysis of the direct and indirect economic impact of proposed sites and routes including, but not limited to, productive agricultural land lost or impaired	4.2.5, 4.3.1, 6.3
	(6) Evaluation of adverse direct and indirect environmental effects that cannot be avoided should the proposed site and route be accepted	All of Section 4 in "Potential Impacts", 6.1-6.6
	(7) Evaluation of alternatives to the applicant's proposed site or route proposed pursuant to subdivisions 1 and 2	Not applicable to alternative process
	(8) Evaluation of potential routes that would use or parallel existing railroad and highway rights-of way	3.2.3, 6.8
	(9) Evaluation of governmental survey lines and other natural division lines of agricultural land so as to minimize interference with agricultural operations	4.3.1, 6.8
	(10) Evaluation of the future needs for additional high voltage transmission lines in the same general area as any proposed route, and the advisability of ordering the construction of structures capable of expansion in transmission capacity through multiple circuiting or design modifications	3.2.2, 6.7
	(11) Evaluation of irreversible and irretrievable commitments of resources should the proposed site or route be approved	6.14
	(12) When appropriate, consideration of problems raised by other state and federal agencies and local entities	5.1

### 1.3 NOTICE TO THE EQB

Minnkota notified the EQB, by letter dated February 22, 2005 that they intended to utilize the Alternative Permitting Process for the proposed Lund Substation 230 kV Transmission Line Tap Project. This complies with the requirement of Minnesota Rule 4400.2000, Subpart 2 to notify the EQB at least 10 days prior to submitting an application. A copy of this notice is attached in Appendix A.

## 2.0 INTRODUCTION

### 2.1 PROJECT NEED

Minnkota owns almost all of the existing 230 kV transmission line between the Moranville substation (located near Warroad, MN) and the Running substation (located near Littlefork, MN). From these two substations, Minnkota serves five distribution substations on its 69 kV system between Warroad and Littlefork. Currently the winter peak load of these five distribution substations is approximately 22 MW.

Due to the sparse nature of Minnkota's loads in this part of northern Minnesota, the five substations require approximately 110 miles of 69 kV transmission lines to serve the electrical loads of this area. Almost all of the 69 kV system is copper or 1/0 aluminum conductor steel reinforced (ACSR) conductor that has been in service for over 40 years and has limited capability.

The loads at the five substations are at a level that certain 69 kV line outages will result in substation voltages below the 90 percent voltage level, which violates one of Minnkota's reliability standards for single contingencies on its 69 kV system. Table 2 shows the amount of load that would be required to shed in order to keep substation voltages at 90 percent or better.

**Table 2**  
**Load Shed Requirements**

69 kV Line Contingency		Load Reduction Required to Maintain 90% Voltage
To Substation	From Substation	
Moranville	Williams	49%
Williams	Wheeler's Point	27%
Spooner Sw.	Birchdale	24%
Birchdale	Running	25%

Minnkota does not have enough load under control to reduce the substation loadings to the levels noted above. Minnkota's load management program is not sufficient to prevent the low voltage conditions from occurring during 69 kV line outages. As a result, Minnkota needs additional facilities in this area to reliably serve the electric load.

The addition of the Lund Substation, which will tap the Moranville to Running 230 kV line near Baudette, MN, is the least cost option to solve the problem presented by 69 kV line outages.

Other alternatives considered reconductoring the existing 69 kV system with a larger conductor and upgrading to a 115 kV operation. Given the long distances involved, 110 miles, neither reconductoring nor upgrading is cost-effective. Minnkota has a well-established load management program, but the amount of load under control would not be sufficient to relieve the low voltage conditions resulting from line outages.

The need of the Lund Substation is to provide reliable service to Minnkota's electric loads served from the 69 kV system between Running and Moranville. Minnkota is not expecting any large new loads to develop in this area, but is expecting modest load growth from the existing loads in the foreseeable future.

## **2.2 STATEMENT OF OWNERSHIP OF THE PROPOSAL**

Minnkota is a regional generation and transmission cooperative serving 11 member-owner distribution cooperatives in eastern and northwestern Minnesota and northeastern North Dakota. Minnkota will construct, own, operate and maintain the 69 kV and 230 kV transmission lines and associated facilities.

## **2.3 PERMITTEE / PROJECT MANAGER**

Permittee:	<b>Minnkota Power Cooperative, Inc.</b>
Contact:	<b>John T. Graves, P.E. Environmental Manager</b>
Address:	<b>1822 Mill Road P.O. Box 13200 Grand Forks, ND 58208-3200</b>
Phone:	<b>(701) 795-4000</b>
Fax:	<b>(701) 795-4214</b>
Email:	<b>jgraves@minnkota.com</b>

## **2.4 PROJECT LOCATION**

The Project will be located in Lake of the Woods County in Sections 19 and 30 in Township 160N, Range 30W, and in Section 24 in Township 160N, Range 31W. The project is located

approximately three miles south of Baudette, Minnesota. A project vicinity and location map is included as Appendix B.1 and B.2.

## **2.5 PROJECT PROPOSAL**

The project proposal includes six primary components associated with a new substation south of Baudette, Minnesota:

1. Construction of a new 230/69 kV substation, to be named the “Lund Substation.” The substation will occupy approximately 3.6 acres of land in the SW<sup>1</sup>/<sub>4</sub> SW<sup>1</sup>/<sub>4</sub> of Section 19, Township 160N, Range 30W.
2. Construction of two new 230 kV single circuit transmission lines in parallel. The new lines will be approximately 0.5 miles long and will extend north from the existing Minnkota Moranville to Running 230 kV transmission line, terminating at the new Lund Substation. The easternmost transmission line will be 90 feet from the westernmost line.
3. A new single circuit 69 kV transmission line will be constructed between the new Lund Substation and the existing Minnkota 69 kV Warroad to Littlefork transmission line. The transmission line will be approximately 0.1 miles in length.
4. Approximately 1.5 miles of the existing 69 kV Warroad to Littlefork single circuit line will be removed between the Lund Substation and the Spooner Switch. This section of the Warroad to Littlefork line will be replaced with a double circuit 69 kV transmission line.
5. Installation of approximately 1.2 miles of buried fiber optic cable primarily within the existing Warroad to Littlefork 69 kV transmission line right-of-way (ROW). Approximately 400 feet of new ROW will be required. The fiber optic cable will connect the new Lund Substation to an existing radio tower.
6. Removal of an existing Baudette tap switch (Spooner Switch) on the Warroad to Littlefork 69 kV line.

Appendix B.2 identifies these project components.

## **2.6 DISCUSSION OF REJECTED ALTERNATIVES**

### **2.6.1 Option 1**

This option would have included 0.5 miles of triple circuit 69 kV transmission line and 1.5 miles of double circuit 69 kV transmission line (Appendix B.3). The new Lund Substation would have been located along the existing 230 kV transmission line east of TH 72. This option was rejected because constructing the substation along the existing 230 kV line would place the substation in a large wetland. The soils analysis indicated that there was an excessive amount of peat that would require large amounts of engineered fill, increasing the cost of the project and impacting the wetland.

### **2.6.2 Option 2**

Option 2 is similar to the proposed Project. This option would locate the new Lund Substation in the SW $\frac{1}{4}$ SW $\frac{1}{4}$  of Section 19, Township 160N, Range 30W (Appendix B.4). It would require 1.5 miles of double circuit 69 kV transmission line. Instead of two 230 kV transmission lines, approximately 0.5 miles of single circuit 230 kV transmission line would be constructed with three non-supervisory 230 kV switches. This option was rejected because after reviewing the costs associated with building a Supervisory Control and Data Acquisition (SCADA) controlled switching station to accommodate line sectionalizing, the costs of building two single circuit 230 kV transmission lines was less than building a switching station along the existing 230 kV line.

### **2.6.3 Option 3**

Option 3 is also similar in scope to the proposed Project. This option would locate the new Lund Substation in the SW $\frac{1}{4}$ SW $\frac{1}{4}$  of Section 19, Township 160N, Range 30W (Appendix B.5). It would require 1.5 miles of double circuit 69 kV transmission line. The 230 kV transmission lines would be consolidated on one structure, and approximately 0.5 miles of double circuit 230 kV transmission line would be constructed. This option was rejected because the double circuit line does not readily allow for future expansion plans at the substation. Future expansion at the substation would require reconfiguring the 230 kV poles at the substation.

### **2.6.4 Reconductor Alternative**

This alternative would replace the conductor on the existing 69 kV transmission line serving Baudette. This was not feasible because the structures were originally designed for 34.5 kV and could not accommodate the larger conductor. Additionally, the upgrade would be expected to cost approximately \$100,000 per mile. A minimum of 60 miles of transmission line would need

to be upgraded at a cost of approximately \$6 million. Since reconductoring the existing transmission line was not feasible due to structure limitations, and since the cost was greater than the proposed option, this alternative was rejected.

### **2.6.5 115 kV Rebuild Alternative**

The rebuild alternative considered upgrading the 69 kV transmission line serving Baudette to 115 kV. Again, 60 miles of line would be upgraded at a cost of \$125,000 per mile. The transmission costs alone would be \$7.5 million, which does not include the substation work that would be required. Cost was the primary reason this alternative was rejected, and the need for the project could be met with a different alternative.

## **2.7 PROJECT SCHEDULE**

Minnkota proposes an in-service date of all the facilities by June 2006. Below is the anticipated schedule of project milestones:

<b>Substation Construction</b>	<b>6/2005 to 6/2006</b>
Civil Work	6/2005 to 8/2005
Concrete Footings	8/2005 to 10/2005
Steel Erection	10/2005 to 11/2005
Electrical Equipment	10/2005 to 2/2006
Testing and Commissioning	2/2006 to 6/2006
<b>69 kV Double Circuit Transmission Line Construction</b>	<b>9/2005 to 11/2005</b>
<b>230 kV Single Circuit Lines Construction</b>	<b>11/2005 to 2/2006</b>
<b>Tap and Modify Existing 230 kV Line</b>	<b>4/2006 to 6/2006</b>
<b>Fiber Optic Cable Installation</b>	<b>9/2005 to 11/2005</b>

## 2.8 PROJECT COSTS

Minnkota has prepared a preliminary cost estimate for the transmission lines and substation construction. The total Project costs are estimated to be \$3.9 million and a breakdown of the preliminary estimate is as follows:

<b>Lund Substation Construction</b>	<b>\$2,500,000</b>
<b>230 kV Transmission Lines</b>	<b>\$400,000</b>
<b>69 kV Transmission Lines</b>	<b>\$240,000</b>
<b>Moranville Line Reactor Addition</b>	<b>\$400,000</b>
<b>Load Management Injector Equipment Move</b>	<b>\$300,000</b>
<b>Fiber Optic Cable</b>	<b>\$80,000</b>
<b>Total Project Costs:</b>	<b><u>\$3,920,000</u></b>

Annual operation and maintenance costs associated with 230 kV transmission lines in Minnkota's system have averaged at four percent of the capital cost, or an average of \$16,000 per mile. Annual operation and maintenance costs associated with 69 kV transmission lines in Minnkota's system have averaged at four percent of the capital cost, or an average of \$3,200 per mile. These costs include tree trimming, ROW spraying, and inspections and maintenance activities.

### **3.0 ENGINEERING DESIGN, CONSTRUCTION, AND RIGHT-OF-WAY ACQUISITION**

#### **3.1 ROUTE DESCRIPTION**

The proposed route is identified in Appendix B.2. Minnkota requests that the EQB grant a route permit for the Project as described below and shown on the route map for the proposed transmission lines and associated facilities. Minnkota requests a 300-foot wide corridor be approved.

##### **3.1.1 230 kV Route**

The new 230 kV lines will be 90' apart and begin approximately 325 feet east of TH 72 at the Moranville to Running 230 kV line. From the existing 230 kV line, the new transmission lines will extend from new dead end structures along the existing line, north for approximately 0.5 miles, terminating in the southwest corner of the new Lund Substation site.

##### **3.1.2 69 kV Routes**

Approximately 1.7 miles of the Warroad to Littlefork 69 kV transmission line will be reconstructed to enter the east side of the new Lund Substation as a single circuit 69 kV line and will then exit the west side of the Lund Substation as a double circuit 69 kV line. The Warroad to Littlefork transmission line is currently a single circuit line on single pole structures with distribution underbuild. The new single circuit 69 kV line will extend north from the existing Warroad to Littlefork 69 kV line approximately 700 feet east of TH 72. The single circuit line will be approximately 0.1 miles long and will enter the substation in the northeast corner. The transmission line will exit from the northwest corner of the substation as a double circuit 69 kV line. The transmission line will cross over TH 72 and will turn north, paralleling the highway 28 feet west of the highway ROW for 0.5 miles. The line will then turn northwest and will utilize the existing 69 kV single circuit line ROW for one mile as a double circuit line to the Spooner Switch. The Spooner Switch, which is located 17 feet east of County Highway 165, will be retired. One circuit of this 1.5-mile double circuit line will connect the existing Warroad to Littlefork line to the Lund Substation and the other circuit will be dedicated to the existing Baudette Substation tap line.

The 0.3 mile portion of the Warroad to Littlefork transmission line that currently follows County Road 80 and turns north on TH 72 near the new Lund Substation will be removed. Additionally,

as a result of the Project, the existing distribution will be placed underground by the distribution cooperative.

### **3.1.3 Fiber Optic Cable**

The fiber optic cable will be installed parallel to the new double circuit 69 kV line. The fiber optic cable will exit from the northwest corner of the substation as an underground facility. The cable will be bored under TH 72 and will turn north, paralleling the highway 30 feet from the center of the existing 80-foot ROW for 0.5 miles. The cable will then turn northwest and will follow the existing 69 kV single circuit line ROW for 0.75 miles. At this point it will turn north for 460 feet, and will terminate at the Minnesota Power Radio Tower located at latitude 48° 40' 13", longitude 94° 34' 24".

## **3.2 ENGINEERING AND OPERATIONAL DESIGN**

### **3.2.1 Transmission Structures and ROW Design**

#### ***3.2.1.1 Transmission Structure Design***

Appendix B.6 depicts the tangent H-frame structures that are proposed for the 230 kV transmission lines. These structures will be, on average, 70 feet tall. Each span will be approximately 600 feet. Each line would utilize 954 54/7 ACSR conductors. Each conductor has an overall diameter of 1.196 inches and weighs 1.229 pounds per lineal foot. Two 3/8-inch 7-strand EHS steel shield wires will also be used on each line.

The new double circuit 69 kV transmission line will be constructed as a wood or steel tangent horizontal line post (Appendix B.7). The structures will be directly embedded into the ground and will be backfilled with crushed rock. On average the structures will be 50 feet tall. Each span will be approximately 325 feet. The line would utilize 4/0 6/1 ACSR conductors. This would use three single conductors in each circuit or a total of six conductors. Each conductor has an overall diameter of 0.563 inches and weighs 0.2911 pounds per lineal foot. One 3/8-inch 7-strand EHS steel shield wires will also be used.

The single circuit 69 kV transmission line that enters the new Lund substation from the east, will be similar to the line that is existing. The poles will be either wood or steel light-duty tangent line poles and on average will be 40 to 45 feet in height. The poles will have distribution underbuild. Each span will be 250 to 275 feet. The line would utilize 1/0 6/1 ACSR conductors. Appendix B.8 represents the pole type that will be used.

Angle structures will be necessary for the Project. These structures will require the use of guy wires (anchors and support cables).

Table 3 summarizes the structure design for each of the lines.

**Table 3**  
**Structure Design Summary**

Line Voltage	Structure Type	Pole Type	Foundation	Double/Single Circuit	Height (feet)	Span (feet)
230 kV	Tangent H-frame	Steel/Wood	Direct Embed	Single	65-80	600
69 kV	Tangent Horizontal Line Post	Steel/Wood	Direct Embed	Double	45-65	325
69 kV	Tangent Line Poles	Steel/Wood	Direct Embed	Single	40-45	250-275

The fiber optic cable will be “plowed in” 30 feet off the center line of the existing 80 foot ROW. The cable will be an 18-24 fiber cable rated for direct burial. That portion of the fiber optic cable that leaves the existing 69 kV ROW to the existing Minnesota Power radio tower will be located on a new 20 foot wide ROW.

### **3.2.1.2 Right-of-Way**

The majority of the new lines will utilize existing ROW. Approximately 94 percent of the line will follow existing roadway and transmission ROW. No new ROW will be required for the single circuit 69 kV line as it will be located on Minnkota property. New ROW will be required for the portion of the line that crosses TH 72, and for the two new 230 kV transmission lines.

Table 4 summarizes the ROW requirements for the proposed project.

**Table 4**  
**Summary of ROW Requirements**

Description	Structure Type	Pole Type	Conductor / Cable Type	Total ROW (feet)
230 kV Single Circuits	H-frame	Steel/Wood	954 54/7 ACSR	240
69 kV Double Circuit	Horizontal Line Post	Steel/Wood	4/0 6/1 ACSR	80
69 kV Single Circuit	Horizontal Line Post	Steel/Wood	4/0 6/1 ACSR	N/A
Fiber Optic	N/A	N/A	18-24 fiber cable rated for direct burial	20*

\* For that portion not contained within the 69kV Double Circuit ROW.

### 3.2.2 Design Options to Accommodate Future Expansion

The new Lund Substation will be designed to accommodate future expansion. This is Minnkota's standard practice when designing substations. Placement of the 230 kV transmission lines in and out of the substation on separate but parallel paths allows for future expansion of the substation. All expansion facilities will be located within the substation site and corridors stated in this application

### 3.2.3 Identification of Existing Utility and Public Rights-of-Way

The project parallels or uses existing utility and highway ROW for all the routes except for 0.1 miles, as indicated on Table 5.

**Table 5**  
**Summary of Utility, Public ROW and Other Corridor Sharing**

Description	Length (miles)	Existing Transmission ROW (miles)	Highway ROW (miles)	New ROW to be acquired (miles)
230 kV Single Circuits	0.5		0.5	0.5
69 kV Double Circuit	1.5	1.4	0.1	0.1
69 kV Single Circuit	0.1			N/A*
Fiber Optic	1.2	1.0	0.1	0.2**

\*Minnkota Property

\*\*Includes 0.1 miles of completely new ROW

## 3.3 RIGHT-OF-WAY ACQUISITION, CONSTRUCTION, RESTORATION, AND MAINTENANCE PROCEDURES

### 3.3.1 Right-of-Way Acquisition

Once approvals from various state, federal and local agencies, and governmental units are secured, land rights acquisition will commence. Land rights include easement acquisition and crossing permits for the transmission lines. Fee interest for the substation has been previously acquired. As general practice, landowners will be contacted to review project details and to discuss the various phases of the transmission line project, including survey and timber removal. Upon completion of the survey and preliminary design, landowners will be contacted and easements/fee acquisition negotiation will commence.

During the acquisition phase of the project, landowners are given a copy of the conveyance documents generally including easements, deeds, offer sheets, and a plan showing the proposed transmission line or facility relative to the landowner's property. In addition to the permanent

easement necessary for the construction of the transmission line, temporary easements may be obtained from certain landowners for temporary storage of poles, vehicles, or other related items. Landowners will be notified in the event site access for soil boring is required to determine soil suitability in areas where certain soil characteristics may require special transmission structure design.

If the existing rights are determined to be adequate, the affected property owners will be contacted and provided with an explanation of Minnkota's intentions regarding use of its easements. If additional ROW is determined to be necessary, customary acquisition procedures will be followed for these rights. Minnkota's ROW representative will be available to discuss easement issues regardless of whether or not additional easement rights are necessary.

### **3.3.2 Transmission Construction Procedures**

After land rights have been secured, landowners will be contacted to discuss the initial construction phase of the project including schedules, ingress and egress to and from the planned facility, tree and vegetation removal, damage mitigation and other related construction activities.

The first phase of construction will involve surveying the centerline of the new transmission line, followed by removal of trees and other vegetation from the right of way. As a general practice, low-growing brush and tree species are allowable at the outer limits of the easement area. Taller tree species that endanger the safe and reliable operation of the transmission facility are removed (Appendix B.12). In developed areas and to the extent practical, existing low-growing vegetation that will not pose a threat to the transmission facility or impede construction will remain in the easement area.

The second phase of construction will involve staking the location of structures, followed by structure installation and stringing of conductor wire. During this phase, appropriate erosion and sediment controls are installed. Poles may be delivered to the staked location or to a designated material yard, depending on the supplier, local conditions, and accessibility. If poles are delivered to the stated site, they are placed on the ROW out of the clear zone of any adjacent highways or designated pathways. The poles are typically framed with insulators and hardware on the ground, and lifted and placed in the hole by a crane. If an existing line must remain available to be in-service during construction for reliability purposes, it is tipped to one side to allow construction of the new line. If there are no reliability issues the existing line can be removed.

Once the structures have been erected, conductors are installed by establishing stringing setup areas within the ROW. The conductors are pulled with a rope lead that connects to every structure through a dolly attached at the insulator location. Temporary guard poles are installed at crossings to provide adequate clearance over other utilities, streets, roads, highways, railroads, or other obstructions after any necessary notifications are made or permit requirements met to mitigate any concerns with traffic flow or operations of other utilities.

The transmission lines will be constructed at existing grade elevations. Grading will occur in situations when it is necessary to provide a level area for construction access and activities. Poles for the transmission lines will be direct embedded. This requires a hole to be dug to a depth of approximately 10 percent of the pole length plus three feet. The poles are then placed in the hole and backfilled with crushed rock. In areas with poor soil, a galvanized steel culvert may also be inserted to stabilize the pole. Any excess soil is typically distributed evenly near the area the soil is removed, unless an alternative is requested by the landowners or others.

### **3.3.3 Fiber Optic Cable**

The fiber optic cable will be installed by a contractor. The fiber optic cable is planned to be installed by “plowing-in” within the existing ROW. To install the cable underneath the highway, a backhoe will dig a temporary hole on either side of the road, and then a pipe is bored underneath the road. The fiber optic cable is pulled through the pipe.

### **3.3.4 Restoration Procedures**

Upon completion of construction activities, landowners will be contacted to determine whether or not construction damages have occurred. Areas that sustain construction damage will be restored to their pre-construction condition to the extent possible. Landowners will be notified of the completion of the project, and asked to report any outstanding construction damage that has not been remedied or any other issue related to the construction of the transmission line. Once construction cleanup is complete and construction damages have been successfully mitigated, landowners will be sent a final contact letter signaling the close of the project and requesting notification of any outstanding issues related to the project.

### **3.3.5 Maintenance Procedures**

Minnkota will periodically use their transmission line ROW to perform inspections, maintain equipment and repair damage. Regular maintenance and inspections will be performed over the life of the facility to ensure a reliable system. Inspections will be done by foot, snowmobile, all-terrain vehicles, pickup truck, or by aerial means. These inspections will be limited to the

acquired ROW and areas where obstructions or terrain require access off the easement. Typically, an aerial inspection of each 230 kV transmission line is done three times per year, whereas an aerial inspection of each 69 kV transmission line is done every other year to ensure reliable operation.

Minnkota will conduct vegetation surveys and remove undesired vegetation that will interfere with the operation of the transmission line. Frequency of vegetation maintenance is on a two- to five-year cycle. ROW clearing practices include a combination of mechanical and hand clearing, along with an application of herbicides where allowed.

### **3.4 SUBSTATIONS**

#### **3.4.1 Lund Substation**

The proposed 230/69 kV substation will be constructed in the SW<sup>1</sup>/<sub>4</sub> SW<sup>1</sup>/<sub>4</sub> of Section 19, Township 160N, Range 30W, one mile north of the intersection of TH 72 and CSAH 19. Approximately 10 acres of land will be acquired adjacent to TH 72 for the substation. The substation footprint will be 3.6 acres, which is a fenced area of 450 feet by 350 feet.

##### ***3.4.1.1 Lund Substation Design***

The new Lund 230 kV transmission substation will be built using a lattice steel design, similar to that of the existing Running Substation. It will be a conventional outdoor open-type air-insulated bus and switch arrangement laid out in an easily expandable ring bus arrangement with a single breaker installed.

The new Lund 230 kV substation will initially include:

- Two 230 kV dead end structures for terminating the single circuit 230 kV tap lines;
- Three motor operated 230 kV line switches for line sectionalizing and isolation;
- One 230 kV breaker and space for three future breakers to accommodate two 230 kV transmission line nodes and two transformer nodes;
- One 230 kV/69 kV 50 MVA transformer with load tap changing equipment and associated switching and protection equipment;
- One 69 kV transformer low side breaker and associated relaying;
- One 69 kV load management injector equipment bay;
- Three 69 kV sub-transmission feeder bays; and
- Two control buildings and station service facilities.

The Lund Substation will be laid out to accommodate additional equipment should significant load growth occur in the area. Ultimately, the substation may contain a full four-breaker 230 kV ring bus and additional transmission line terminations, capacitor banks, transformers, and sub-transmission feeders. A preliminary substation layout is included as Appendix B.9.

#### ***3.4.1.2 Lund Substation Construction***

Construction of the new substation will begin once the final design is complete, and the property is acquired. A construction schedule will be developed based upon availability of crews, outage restrictions for any transmission lines that may be affected, weather conditions, spring load restrictions on roads, and any restrictions placed on certain areas for minimizing impacts from construction.

Less than five acres of land will be graded to construct the substation and approach road. The concrete slab foundation and pier footings will be poured to support the substation equipment and control house. Once the site is graded, a perimeter fence will be installed to secure the site and substation erection will commence.

Minnkota will implement erosion and sediment control methods to minimize runoff during substation construction. Minnkota construction crews or a Minnkota contractor will comply with local, state, National Electric Safety Code (NESC), Rural Utilities Service (RUS), and Minnkota standards regarding clearance to ground, clearance to crossing utilities, clearance to buildings, right of way widths, erection of power poles, and stringing of transmission line conductors. Minnkota follows the RUS Design Manual for High Voltage Transmission Lines (U.S. Department of Agriculture, 1992).

#### **3.4.2 Moranville Substation**

Protective relay modifications will be required to coordinate with the new Lund Substation tap of the existing line. A 25 MVAR line reactor will also be installed for voltage control during light loading and abnormal switching conditions. No modifications are planned on the distribution portion of this substation. There is sufficient space at the substation property to accommodate the upgrade. No new land will be purchased. No expansion of the existing fenced area is anticipated.

#### **3.4.3 Running Substation**

The Running Substation will also require protective relay modifications similar to the Moranville Substation. No modifications are planned on the distribution portion of this substation. There is

sufficient space at the substation property to accommodate the upgrade. No new land will be purchased. No expansion of the existing fenced area is anticipated.

#### **3.4.4 Substation Property Acquisition**

Minnkota has previously acquired the property for the substation.

During the substation construction phase, any affected property owners will be advised as to the construction schedules or needed access to the site. To construct, operate and maintain the proposed substation, all vegetation will be cleared from the substation footprint area, from the substation driveway area, and from a buffer area 10 feet outside the substation fence. Vegetation on the property outside of the substation footprint, driveway, and buffer will be left undisturbed, except where it must be impacted to allow for transmission line access to the substation.

#### **3.4.5 Substation Restoration and Maintenance Procedures**

Upon completion of construction activities, Minnkota will restore the site. Post-construction reclamation activities include the removing and disposing of debris, dismantling of all temporary facilities (including staging areas), employing appropriate erosion control measures, and reseeding areas disturbed by construction activities with vegetation similar to that which was removed. Where appropriate, Minnkota will incorporate methods to screen the final site.

Minnkota will perform periodic inspections, maintain equipment, and make repairs over the life of the substation. Minnkota will also conduct routine maintenance as required to remove undesired vegetation that may interfere with the safe and reliable operation of the substation.

### **3.5 ELECTRIC AND MAGNETIC FIELDS**

The term EMF refers to electric and magnetic fields that are present around any electrical device. Electric fields arise from the voltage or electrical charges and magnetic fields arise from the flow of electricity or current that travels along transmission lines, distribution (feeder) lines substation transformers, house wiring, and electrical appliances. The intensity of the electric field is related to the voltage of the line and the intensity of the magnetic field is related to the current flow through the conductors (wire). EMF can occur indoors and outdoors.

Considerable research has been conducted throughout the past three decades to determine whether exposure to power-frequency (60 Hz) electric and magnetic fields cause biological responses and health effects. Epidemiological and toxicological studies have shown no statistically significant association or weak associations between EMF exposure and health risks.

In 1999, The National Institute of Environmental Health Sciences (NIEHS) issued its final report on “Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields” in response to the 1992 Energy Policy Act. NIEHS concluded that the scientific evidence linking EMF exposures with health risks is weak and that this finding does not warrant aggressive regulatory concern. However, because of the weak scientific evidence that supports some association between EMF and health effects and the common exposure to electricity in the United States, passive regulatory action, such as providing public education on reducing exposures is warranted.

Minnesota, California, and Wisconsin all have recently conducted literature reviews or research to examine this issue. In 2002, Minnesota formed an Interagency Working Group to evaluate the body of research and develop policy recommendations to protect the public health from any potential problems resulting from High Voltage Transmission Lines (HVTL) EMF effects. The Working Group consisted of staff from the Department of Health, the Department of Commerce, the Public Utilities Commission, the Pollution Control Agency, and the Environmental Quality Board. The Department of Health coordinated the activities of the Working Group. In September 2002, the Working Group published its findings in a White Paper on Electric and Magnetic Field (EMF) Policy and Mitigation Options (White Paper) (White Paper 1).

The following summarizes the findings of the Working Group:

Research on the health effects of EMF has been carried out since the 1970’s. Epidemiological studies have mixed results – some have shown no statistically significant association between exposure to EMF and health effects, some have shown a weak association. More recently, laboratory studies have failed to show such an association, or to establish a biological mechanism for how magnetic fields may cause cancer. A number of scientific panels convened by national and international health agencies and the United States Congress have reviewed the research carried out to date. Most panels concluded that there is insufficient evidence to prove an association between EMF and health effects; however many of them also concluded that there is insufficient evidence to prove that EMF exposure is safe (White Paper 1).

Recent reviews of potential human health effects from transmission line EMF were completed in California (California EMF Program 383) as part of the State of California EMF Program and in Wisconsin for the Arrowhead-Weston EIS (Arrowhead-Weston 5-21). Both studies have similar

conclusions of no discernible health impacts from power lines. Both of these studies recommend the general precaution of minimizing unnecessary contact and advise prudent avoidance to EMF exposure.

### 3.5.1 Electric and Magnetic Fields

The 230 kV and 69 kV transmission lines were modeled using the Bonneville Power Administration Corona and Fields Interactive 1989 Experimental (CFI8X) model to evaluate EMF from high voltage transmission lines. Where possible, HDR executed the CFI8X model in a worst-case manner, to ensure that EMF was not under-predicted. This involved adjusting the orientation of phase angles used in the CFI8X model.

#### 3.5.1.1 Electric Forces and Magnetic Fields from 230 kV Line

HDR modeled electric forces and magnetic fields from the proposed single circuit 230 kV on a tangent structure. Phase angles were modeled as: 240, 120, 0, 0, 120, 240 degrees (from left to right). HDR assumed 1,000 amps – the maximum capacity for the proposed conductors. The model predicted electric forces and magnetic fields as shown in Table 6. The model assumes the predicted fields occur at a point approximately 3.5 feet above the ground (assumed to represent the center of an average human body). The model was executed to determine which phase angle arrangement produces worst case electric and magnetic forces. Electric forces peak at the mid-point between the two structures (“0” in the table below), and the predicted forces are 1.25 kV/m. Magnetic fields peak at + 40 feet from the mid-point of the two structures, and the predicted forces are 75.87 milligauss.

**Table 6**  
**Predicted electric forces and magnetic fields from 230 kV Lines**

Distance from Center of transmission line corridor (feet)	-300	-200	-100	-50	0	50	100	200	300
Electric forces 230 kV line (kV/meter)	0.03	0.13	0.72	0.35	1.25	0.35	0.72	0.13	0.03
Magnetic fields 230 kV line (Milligauss)	1.90	6.45	40.28	74.11	72.5	74.11	40.28	6.45	1.90

### 3.5.1.2 Electric Forces and Magnetic Fields from 69 kV Line

HDR modeled electric forces and magnetic fields from the proposed double circuit 69 kV on a tangent structure. This analysis relied on the following assumptions. The six conductors were assumed to be grouped in pairs, on opposing insulators arranged on a single pole at heights of 53, 45, 37 feet above the ground. Each insulator was assumed to be 2.28 feet long, and the pole width was assumed to be 1 foot. The conductor diameter was assumed to be 0.563 inches, based on the Anderson Electrical Connectors Technical Data booklet. The line to neutral voltage was calculated to be 38.68 kV. Phase angles were modeled as 0, 0, 120, 120, 240, and 240 degrees, respectively. HDR modeled 400 amps, the maximum for the proposed conductors. The model predicted electric forces and magnetic fields relative to the axis of the poles, at a point approximately 3.5 feet above the ground (assumed to represent the center of an average human body). Table 7 shows the predicted electric forces and magnetic fields.

**Table 7**  
**Predicted electric forces and magnetic fields from 69 kV Lines**

Distance from Center of power line (feet)	-300	-200	-100	-50	0	50	100	200	300
Electric forces 69 kV line (kV/meter)	0.01	0.02	0.04	0.04	0.58	0.04	0.04	0.02	0.01
Magnetic field 69 kV line (Milligauss)	0.79	1.74	6.18	17.14	43	17.14	6.18	1.74	0.79

### 3.5.2 Stray Voltage

Stray voltage is defined as a natural phenomenon that can be found at low levels between two contact points in any animal confinement area where electricity is grounded. By code, electrical systems, including farm systems and utility distribution systems, must be grounded to the earth to ensure continuous safety and reliability. Inevitably, some current flows through the earth at each point where the electrical system is grounded and a small voltage develops. This voltage is called neutral-to-earth voltage (NEV). When a portion of this NEV is measured between two objects that may be simultaneously contacted by an animal, it is frequently called stray voltage. Stray voltage is not electrocution, ground currents, EMFs, or earth currents. It only affects farm animals that are confined in areas of electrical use. It does not affect humans.

Stray voltage has been raised as a concern on some dairy farms because it can impact operations and milk production. Problems are usually related to the distribution and service lines directly

serving the farm or the wiring on a farm. In those instances when transmission lines have been shown to contribute to stray voltage, the electric distribution system directly serving the farm or the wiring on a farm was directly under and parallel to the transmission line. These circumstances are considered in installing transmission lines and can be readily mitigated. The proposed 69 kV and 230 kV transmission lines are not proposed to run parallel to any existing distribution line for long distances. Therefore, no stray voltage issues are anticipated with this Project.

## **4.0 ENVIRONMENTAL INFORMATION**

This section provides a description of the environmental setting, potential impacts and mitigative measures Minnkota has proposed. Measures to minimize the impacts of siting, constructing and operating the proposed Project are also addressed if necessary.

### **4.1 DESCRIPTION OF ENVIRONMENTAL SETTING**

The proposed Project is located approximately three miles south of the town of Baudette, Minnesota. It is located adjacent to the Carp Swamp Wildlife Management Area (WMA). According to the Minnesota Department of Natural Resources (DNR) Ecological Classification System, the project is located in the Agassiz lowlands. This area is dominated by peatlands and encompasses a portion of the Glacial Lake Agassiz. There are several active gravel pits along the Warroad to Littlefork 69 kV line and a sawmill within the Project area west of TH 72. There are some residences north of the Project area. The major land uses are forestry and recreation in the region. Most of the surrounding land uses are recreational, with some agricultural lands to the north and east.

### **4.2 HUMAN SETTLEMENT**

#### **4.2.1 Public Health and Safety**

##### ***4.2.1.1 Potential Impacts***

The Project is designed in compliance with local, state, NESC, RUS, and Minnkota standards regarding clearances and installation of the facilities. The proposed line and substation will be equipped with protective devices to safeguard the public from the transmission line and substation if an accident occurs. Protective devices include breakers and relays located where the line connects to the substation. This equipment will de-energize the line should such an event occur. In addition, the substation facility will be fenced and access limited to authorized personnel. Proper signage will be posted warning the public of the risk of coming into contact with the energized equipment.

##### ***4.2.1.2 Mitigative Measures***

There are no mitigative measures necessary to address human health and safety.

#### **4.2.2 Displacement**

##### ***4.2.2.1 Potential Impacts***

Displacement of residential homes or businesses is not anticipated.

#### ***4.2.2.2 Mitigative Measures***

Since no displacement will occur, no mitigative measures are required.

### **4.2.3 Noise**

#### ***4.2.3.1 Potential Impacts***

Noise is comprised of a variety of sounds of different intensities, across the entire frequency spectrum. Humans perceive sound when sound pressure waves encounter the auditory components in the ear. These components convert these pressure waves into perceivable sound. Transmission conductors and transformers at substations produce noise under certain conditions. The level of noise or its loudness depends on conductor conditions, voltage level, and weather conditions. Noise emission from a transmission line occurs during heavy rain and wet conductor conditions. In foggy, damp, or rainy weather conditions, power lines can create a subtle crackling sound due to the small amount of the electricity ionizing the moist air near the wires. During heavy rain the general background noise level is usually greater than the noise from a transmission line. In addition, very few people are out near the transmission line. For these reasons audible noise is not noticeable during heavy rain. During light rain, dense fog, snow, and other times when there is moisture in the air, the proposed transmission lines will produce audible noise higher than rural background levels but similar to household background levels. During dry weather, audible noise from transmission lines is an imperceptible, sporadic crackling sound.

Noise is measured in units of decibels (dB) on a logarithmic scale. Because human hearing is not equally sensitive to all frequencies of sound, certain frequencies are given more “weight.” The A-weighted (dBA) scale corresponds to the sensitivity range for human hearing. Noise levels capable of being heard by humans are measured in dBA, the A-weighted sound level recorded in units of decibels. A noise level change of 3-dBA is imperceptible to human hearing. A 5-dBA change in noise level, however, is clearly noticeable. A 10-dBA change in noise levels is perceived as a doubling of noise loudness, while a 20-dBA change is considered a dramatic change in loudness. Table 8 shows noise levels associated with common, everyday sources, and places the magnitude of noise levels discussed here in context.

**Table 8**  
**Common Noise Sources and Levels**

Sound Pressure Level (dB)	Typical Sources
120	Jet aircraft takeoff at 100 feet
110	Same aircraft at 400 feet
90	Motorcycle at 25 feet
80	Garbage disposal
70	City street corner
60	Conversational Speech
50	Typical office
40	Living room (without TV)
30	Quiet bedroom at night

Source: Environmental Impact Analysis Handbook, ed. By Rau and Wooten, 1980

Minnesota Rule 7030.0040 establishes standards to regulate noise levels by land use types. Land uses such as picnic areas, churches or commercial land are assigned to an activity category based on the type of activities or use occurring in the area. Activity categories are distinguished by their sensitivity to traffic noise. The Noise Area Classification (NAC) is listed in the Minnesota Pollution Control Agency (MPCA) noise regulations (Minnesota Rule 7030.0050). Table 9 identifies the established noise standards for daytime and nighttime grouped by NAC.

**Table 9**  
**Noise Standards by Noise Area Classification**

Noise Area Classification	Daytime		Nighttime	
	L <sub>50</sub>	L <sub>10</sub>	L <sub>50</sub>	L <sub>10</sub>
1	60	65	50	55
2	65	70	65	70
3	75	80	75	80

In Minnesota, the L10 and L50 are used to evaluate noise levels and identify noise impacts. The L10 is defined as the noise level exceeded 10 percent of the time, or for six minutes in an hour. The L50 is the noise level exceeded 50 percent of the time, or for 30 minutes in an hour.

A residence is the nearest noise-sensitive receptor to the substation and would fall under NAC 1. The nearest residence is located approximately 1600 feet from the substation. West of TH 72 is a small sawmill.

HDR Engineering, Inc. (HDR) previously conducted noise monitoring at a similar rural proposed substation site. Noise monitoring was conducted in accordance with MPCA Rule 7030.0060. Readings were taken with a Quest Technologies Model 2900 Integrating/Logging Sound Level Meter.

MPCA State Noise Standards exist for both Daytime (7:00 am – 10:00 pm) and Nighttime (10:00 pm – 7:00 am). Therefore, measurements were taken from 6-7 am and from 7-8 am at the monitoring location. The monitoring location for the proposed substation was chosen in a field, approximately 500 feet from the roadway. This location was chosen to represent background noise levels currently existing in this rural area.

Results are given in Table 10 and compared to MPCA Standards.

**Table 10**  
**Comparison of Monitoring Results with MPCA Standards**

Substation	NAC	Duration of Event	Temp °F	Monitored Day L <sub>10</sub> (dBA)	Monitored Day L <sub>50</sub> (dBA)	MN Day L <sub>10</sub> Standard (dBA)	MN Day L <sub>50</sub> Standard (dBA)	Monitored Night L <sub>10</sub> (dBA)	Monitored Night L <sub>50</sub> (dBA)	MN Night L <sub>10</sub> Standard (dBA)	MN Night L <sub>50</sub> Standard (dBA)
Proposed Substation Site	1	60 min.	14	47	41	65	60	50	41	55	50

These noise monitoring results are considered conservative, as the proposed Lund Substation site has more background noise producers nearby, including a small sawmill and TH 72.

The nearest noise-sensitive receptor to the proposed Lund Substation is a residence approximately 1600 feet away. Noise expected from the 230 kV single circuit transmission lines is 28.5 dbA at 300 feet. At 1600 feet noise would be expected to be 21.2 dBA. Noise levels of this magnitude will not increase the existing background noise levels at the nearest residence.

There will not be any noise impacts associated with this substation at the nearest noise receptor.

The 230 kV and 69 kV transmission lines were modeled using the Bonneville Power Administration Corona and Fields Interactive 1989 Experimental (CFI8X) model to evaluate audible noise from high voltage transmission lines. Where possible, HDR executed the CFI8X model in a worst-case manner, to ensure that corona noise was not under-predicted. This involved adjusting the orientation of phase angles used in the CFI8X model. HDR modeled corona noise from the proposed single circuit 230kV transmission lines on a tangent structure. This analysis relied on the following assumptions. The six conductors for each circuit (a total of 12 conductors) were assumed to be approximately 60 feet above the ground, and spaced 20 feet apart. The conductor diameter was assumed to be 1.196 inches, based on the Anderson Electrical Connectors Technical Data booklet. The line to neutral voltage was calculated to be 132.79 kV. Phase angles were modeled as 240, 120, 0, 0, 120, and 240 degrees, respectively. Table 11 presents modeling results in dBA on an L50 basis. These levels are predicted to occur at a point five feet above the ground and are positioned at the centerline between the two structures during wet conditions. The attenuation rate is approximately -4 dB per distance doubled. This rate is typical of noise sources that are characterized as line sources.

**Table 11**  
**Corona Noise**

Distance from Center of transmission line corridor (feet)	-300	-200	-100	-50	0	50	100	200	300
Corona Noise, L <sub>50</sub> (dBA) from 230 kV line	37	39	43	44	44	44	43	39	37

#### ***4.2.3.2 Mitigative Measures***

Although radio and television interference sometimes occurs, Minnkota investigates all such problems and corrects those problems caused by Minnkota facilities. Minnkota does not expect that there will be any impacts from the operation of the new line.

No additional mitigative measures are necessary since there will be nominal corona or noise impacts from the transmission line and proposed substation.

## 4.2.4 Aesthetics

### 4.2.4.1 Potential Impacts

The proposed structures will be similar to the existing land uses near the site. The sawmill represents current industrial activity in the area. Most of the proposed routes follow existing utility and roadway ROW and the substation will be located adjacent to an existing highway and transmission line ROW. Approximately 6 percent of the transmission line length does not parallel existing ROW. The line will be visible to recreationalists using the Carp Swamp WMA and likely to several residences north of the substation and 230 kV lines. The new 69 kV transmission line poles will be approximately 15 to 20 feet taller than the existing 69 kV poles. The substation has been located in a rural area, minimizing impacts to landowners in the area. The lines and the substation will be visible to motorists along TH72 and from several houses north of the substation.

### 4.2.4.2 Mitigative Measures

No mitigative measures are planned since the Project will be comparable to existing transmission infrastructure in the area and the activities related to the sawmill.

## 4.2.5 Socioeconomic

Population and economic characteristics based on the 2000 U.S. Census are presented in Table 12. The data represent a summary of this information for the county and block group in the project area, which is the smallest geographic unit the census measures.

**Table 12**  
**Population and Economic Characteristics**

Location	Population	Per Capita Income	Percentage of Population Below Poverty Level
Lake of the Woods County	4,522	\$16,976	9.8
Block Group 1, Census Tract 9603	1,837	\$18,482	--

According to the 2000 Census race demographics, Lake of the Woods County is 97 percent white. The Census Tract and Block Group that the Project occurs is approximately 94 percent white, similar to the trend in the county. Minority groups in the area constitute a very small percentage of the total population. The 2000 Census shows that the primary minority group in this Block Group is “American Indian and Alaska Native.” The Project area does not contain disproportionately high minority populations or low-income populations.

The local economy is derived primarily from manufacturing, agriculture, timber and tourism.

#### ***4.2.5.1 Potential Impacts***

Between 10 and 15 workers will be required for the construction of the 230 kV transmission lines and an additional 10 to 15 workers will be required for construction of the 69 kV transmission lines. During construction, there will be a small positive impact on the local community due to the additional revenue created from expenditures of the construction crews in the local community. Crews are expected to purchase local community services, hotels, restaurants, and materials such as concrete and rock. It is not expected that additional permanent jobs will be created by this Project.

#### ***4.2.5.2 Mitigative Measures***

Mitigative measures are not necessary.

### **4.2.6 Cultural Values**

Cultural values include those perceived community beliefs or attitudes in a given area, which provide a framework for each social group's unity. The Baudette area of Lake of the Woods County originally began as a steamboat landing and lumber town with a sawmill. Now, the area near Baudette primarily caters to recreationalists lured by the abundant opportunities in the area.

#### ***4.2.6.1 Potential Impacts***

No impacts are anticipated to the communities' cultural values due to the construction of the transmission lines and the construction of the substation.

#### ***4.2.6.2 Mitigative Measures***

No impacts are anticipated; therefore no mitigative measures are required.

### **4.2.7 Recreation**

Recreational opportunities near the Project include Carp Swamp WMA, Spooner WMA, Silver Creek WMA, and the Baudette-Norris Snowmobile Trail. Carp Swamp WMA will be crossed by the proposed 69 kV transmission line on existing transmission line ROW. The WMA is a large wetland complex and has two snowmobile trails that traverse it, including the Baudette-Norris Trail. Spooner WMA is located approximately 2.5 miles west from the proposed 69 kV transmission line. Silver Creek WMA is located three miles east of the Project. Wildlife management areas provide recreation opportunities to upland, waterfowl, and deer hunters and also provide excellent bird watching opportunities. These areas are also managed for wildlife production.

#### ***4.2.7.1 Potential Impacts***

Physical impacts will occur to the Carp Swamp WMA due to the placement of transmission line poles. There is currently a transmission line that follows the ROW that will be occupied by the transmission line. No additional ROW will be required in the WMA for the transmission line. The 69 kV transmission line will be visible to recreationalists in this portion of the WMA and possibly to individuals using the Baudette-Norris Snowmobile Trail.

The 230 kV transmission lines will be visible to individuals using this resource. The existing 230 kV line currently bisects the WMA. It is not anticipated that the new 230 kV transmission lines will alter the visual character of the area to a greater extent than the existing transmission lines. The new poles for the double circuit portion of the 69 kV transmission line will be approximately 15 to 20 feet taller than the existing 69 kV poles. The new poles for the single circuit portion of the 69 kV transmission line will be will be approximately 10 to 15 feet taller than the existing poles.

#### ***4.2.7.2 Mitigative Measures***

To the extent possible, Minnkota will follow existing transmission and highway corridors to minimize the impacts to the recreation in the area.

### **4.2.8 Public Services**

Public Services are limited in the immediate vicinity of the Project. The City of Baudette provides public services typical of those of small cities. These services include a volunteer fire department, police, sheriff, EMT, water, bus, medical, library, electricity, natural gas, wastewater treatment, and drinking water. Baudette also has an international airport, but is primarily charter flights and general aviation. There are currently no commercial flights.

#### ***4.2.8.1 Potential Impacts***

No impacts are anticipated to public services.

#### ***4.2.8.2 Mitigative Measures***

A Notice of Proposed Construction or Alteration will be submitted to the Federal Aviation Administration (FAA). No additional mitigative measures are anticipated.

## **4.3 LAND-BASED ECONOMICS**

### **4.3.1 Agriculture**

Although agriculture is an important commodity for the County, the area primarily thrives on the recreation industries and forestry. According to the 2002 Census of Agriculture, the number of

farms has increased by 12 percent since 1997. There are currently 266 farms in Lake of the Woods County. The top commodity (by acreage harvested) in Lake of the Woods County is wheat.

#### ***4.3.1.1 Potential Impacts***

No agricultural land that is currently being farmed will be taken out of production as a result of the construction and operation of the Project.

#### ***4.3.1.2 Mitigative Measures***

No mitigative measures are required since no impacts to agriculture are anticipated.

### **4.3.2 Forestry**

The project is located approximately two miles northwest of the Pine Island State Forest and approximately 2.5 miles east of the Beltrami Island State Forest. Common tree species in this region include black spruce, aspen, birch, and tamarack. Forestry is an important land use in this area. Black spruce, red and jack pine, and quaking aspen are commonly used for paper manufacturing and saw logs. Jack pine, in particular, is a common tree in the Beltrami Island State Forest.

#### ***4.3.2.1 Potential Impacts***

Impacts to economically important tree stands are not anticipated. Trees will need to be removed along the entire 230 kV corridor. Approximately 0.5 acres of trees will be removed along this corridor. Some tree removal may be required during the installation of the fiber optic line.

#### ***4.3.2.2 Mitigative Measures***

Only those trees that endanger the safe and reliable operation of the transmission line will be removed.

### **4.3.3 Tourism**

Tourism in Lake of the Woods County centers around the abundant recreational resources in the area and the natural environment. Carp Swamp WMA, snowmobile trails, Pine Island State Forest, and Beltrami Island State Forest, and the Rainy River are the primary tourist attractions within the project vicinity.

#### ***4.3.3.1 Potential Impacts***

Aesthetic impacts discussed in Section 4.2.4 are likely near the Carp Swamp WMA. However, no impacts are anticipated to the resources used by tourists in the project vicinity.

#### ***4.3.3.2 Mitigative Measures***

No mitigation is necessary.

#### **4.3.4 Mining**

The surficial geology of the region is characterized by widespread deposits of peat with localized areas of sand and clay/silt. In the vicinity of the project area, the geology is described as lake-modified tills that are part of the Eskine Moraine Association of the Des Moines Lobe. The deposits were reworked during a readvance of glacial Lake Agassiz. The till is generally exposed along major streams and is high in clay content, calcareous, and contains numerous rock fragments. Just north of the site, lacustrine clays up to 50-feet in thickness have been reported. Glacial drift thickness in the vicinity of the project area is approximately 150 feet.

The regional bedrock geology consists of a complex of Precambrian igneous and metamorphic rocks that make up portions of the volcanic and gneissic superbelt found in northern Minnesota. The bedrock underlying the project area is classified as a Precambrian undifferentiated mix of igneous and metamorphic rocks. Aeromagnetic data estimates the bedrock surface elevation to be 950-ft AMSL.

According to the Mn/DOT County Pit Maps for Lake of the Woods County, there are 4 active gravel pits, 3 active Mn/DOT gravel pits, and 1 inactive Mn/DOT gravel pit within 1-mile of the project site. The majority of the gravel pits are in relatively close proximity of the site.

##### ***4.3.4.1 Potential Impacts***

Since the proposed project line will be following the current right-of-ways, disruption to existing aggregate facilities is not likely.

##### ***4.3.4.2 Mitigative Measures***

Since no impacts are anticipated, no mitigative measures are necessary.

#### **4.4 ARCHAEOLOGICAL AND HISTORIC RESOURCES**

Minnkota initiated a cursory review of known cultural resources studies in the vicinity. No cultural resources surveys have been conducted in the project area or the immediate vicinity. A review of SHPO files identified two cultural resources near Baudette, Minnesota (Table 13). Previously recorded sites include the possible remnants of two historic sawmills along the Rainy River. Site 21LWp is east of Baudette and approximately four miles north of the study area. Site 21LWq is northwest of Baudette and approximately four miles northwest of the study area.

**Table 13**  
**Previously Identified Archaeological Sites and Archaeological Sites Leads**  
**within the Project Study Area**

Site Number	Site Name	Type	Location			Comments
			T	R	S	
21LWq	Engler Sawmill	Historic Sawmill	161N	31W	35	Historic sawmill completely destroyed; airport site
21LWp	Shevlin-Mathieu Sawmill	Historic Sawmill	160N	30W	6	Historic sawmill destroyed; surface remains include concrete slabs and footings; housing development

Two previous cultural resources surveys have been conducted in the Baudette vicinity. The Minnesota Department of Transportation (MNDOT) conducted an archaeological resources survey for improvements to TH 11 west of Baudette, approximately four miles northwest of the study area. No cultural resources were identified during the survey. A DNR survey was completed for the proposed development of a new Public Water Access (PWA) facility on the south shore of the Rainy River, east of Baudette and approximately four miles north of the study area. No cultural materials were identified.

A review of Public Land Office maps from 1899 and 1903 indicate that the project area was largely inundated until the landscape was altered by twentieth century drainage activities. This pre-settlement topography would not likely support a stable landform for the development of significant or intact archaeological sites. The strip of relatively high elevation in Section 24, where Minnkota proposes to replace the existing single circuit 69 kV transmission line with a shielded double circuit 69 kV transmission line, appears dry on the 1903 survey maps. Two historic activities along this landform, construction of the existing transmission line and modern aggregate materials mining, have probably compromised the surface and subsurface integrity in the project area and vicinity through this section. Minnkota proposes that the project area has a low potential for intact archaeological resources. In written correspondence, the Minnesota State Historic Preservation Office (SHPO) indicated that they believed the proposed project would not impact properties listed on or eligible for listing on the National Register of Historic Places.

#### **4.4.1 Potential Impacts**

Minnkota does not anticipate adverse impacts to archaeological resources as a result of the proposed project.

#### **4.4.2 Mitigative Measures**

Because adverse impacts to archaeological resources are not anticipated, mitigation measures are not proposed.

### **4.5 NATURAL ENVIRONMENT**

#### **4.5.1 Air Quality**

Corona and nitrogen oxide emissions are the primary air quality concerns related to transmission lines. Corona can produce ozone and oxides of nitrogen in the air surrounding the conductor. Corona consists of the breakdown or ionization of air in a few centimeters or less immediately surrounding conductors. It occurs when the electric field intensity, or surface gradient, on the conductor exceeds the breakdown strength of air. Usually some imperfection such as a scratch on the conductor or a water droplet is necessary to cause corona. Ozone also forms naturally in the lower atmosphere from lightning discharges and from reactions between solar ultraviolet radiation and air pollutants such as hydrocarbons from auto emissions. The natural production rate of ozone is directly proportional to temperature and sunlight and inversely proportion to humidity. Thus, humidity (or moisture), the same factor that increases corona discharges from transmission lines, inhibits the production of ozone. Ozone is a very reactive form of oxygen and combines readily with other elements and compounds in the atmosphere. Because of its reactivity, it is relatively short-lived.

The Environmental Protection Agency (EPA) promulgated regulation on the permissible concentrations of ozone and oxides of nitrogen (62 Federal Register 38856). The national standard is 0.08 ppm on an eight-hour averaging period. The Minnesota State ambient air quality standard is 0.08 ppm based upon the fourth-highest eight-hour daily maximum average in one year (Minn. Rules 7009.0080).

##### ***4.5.1.1 Potential Impacts***

Studies designed to monitor the production of ozone under transmission lines have generally been unable to detect any increase in ozone levels due to the transmission line facility. Given this, there will be no measurable impacts relating to ozone for the 230 kV transmission lines. For a 69 kV transmission line, the conductor surface gradient is usually below the air breakdown level.

During construction of the proposed transmission lines and substation, there will be limited emissions from vehicles and other construction equipment and fugitive dust from ROW clearing.

Temporary air quality impacts caused by construction-related emissions are expected to occur during this phase of activity.

The magnitude of construction emissions is influenced heavily by weather conditions and the specific construction activity occurring. Exhaust emission from primarily diesel equipment will vary according to the phase of construction, but will be minimal and temporary. Adverse impacts to the surrounding environment will be short and intermittent nature of the emission and dust-producing construction phase.

#### ***4.5.1.2 Mitigative Measures***

Minnkota does not anticipate permanent impacts to air quality. During construction, Minnkota will use applicable best management practices (BMP), such as dust control to minimize the temporary impacts related to construction activities.

### **4.5.2 Water Quality**

#### **Surface Water**

The proposed Project is located in the Rainy River – Baudette watershed in the Rainy River basin. The surface water resources that could be affected by the construction of the transmission lines and substation construction include an unnamed wetland to the south of the substation, Carp Swamp to the west of the substation, and unnamed tributaries to the northeast of the substation. Carp Swamp and the large wetland to the north of County Road 166 drain to the Baudette River.

The proposed transmission lines will cross several wetland complexes identified on the National Wetland Inventory (NWI) maps of the U.S. Fish and Wildlife Service (USFWS). These wetlands are all Palustrine and include emergent, forested and scrub-shrub types. Land Use data from the Minnesota Land Cover Classification System (MLCCS) indicates that the areas to the west and south of the proposed transmission lines are open, and black spruce bog, and black spruce swamp vegetation types. These areas have surface waters that are extremely acidic (pH <4.4) with low concentrations of dissolved nutrients such as calcium (Ca<sup>2+</sup>). Water tables for these areas are near the surface during the spring, but generally fall through the summer.

No Public Waters are identified on the Public Water Inventory (PWI) maps.

### **Hydrogeology**

The uppermost aquifer consists of confined units located within the area's glacial drift deposits. The glacial deposits are composed of lake-modified tills that are high in clay content. Due to the high clay content of the glacial material and the presence of confining units, the aquifer's susceptibility to contamination is likely low to moderate. The potentiometric surface in the aquifer is approximately 1075-ft AMSL. Regional groundwater flow is directed northeast from the project site toward the Rainy River. The site lies along the approximate border between the groundwater recharge and groundwater discharge areas of the watershed. The regional groundwater in the quaternary drift is defined mainly as a calcium-magnesium bicarbonate type. In areas like the project site, where groundwater moves through clay rich till, it takes on a sodium bicarbonate nature.

The bedrock underlying the project site is composed of igneous and metamorphic rocks. Groundwater flow through these units is limited to local faults and fractures that may be interconnected. The bedrock unit does not sustain a significant aquifer.

#### ***4.5.2.1 Potential Impacts***

During construction there is a possibility of sediment reaching surface waters as the ground is disturbed by excavation, grading, and construction traffic. Once the transmission line construction is complete, it will have no impact on surface water quality.

Impacts may occur to wetlands identified on the NWI maps underneath the proposed 230 kV transmission lines and adjacent to the existing 69 kV line. The substation construction may impact small emergent and scrub shrub wetlands due to project construction, according to the NWI maps. After discussions with the COE and the Wetland Conservation Act Local Government Unit (LGU), there is a possibility that the area that the substation occupies may have reverted back to a wetland. A wetland delineation will be conducted before construction commences.

#### ***4.5.2.2 Mitigative Measures***

Wetlands impacts have been avoided to the extent practicable. Minnkota chose an alternative for the substation location that minimized impacts to wetlands. Minnkota will construct the 230 kV transmission lines in the winter months to minimize impacts to the wetlands. The 69 kV line will be constructed along the existing ROW. No additional wetland impacts are expected due to the double circuit 69 kV line construction. Minnkota will obtain the necessary wetland permits from the COE, DNR, and the LGU prior to project construction.

A Storm Water Pollution Prevention Plan (SWPPP) will be developed and will minimize erosion and sedimentation at the site. Best Management Practices such as the use of hay bales, sediment control fence, and seeding and mulching will be implemented. Additionally, a Spill Prevention, Control and Countermeasure (SPCC) plan will be developed to further protect water quality in the area.

#### **4.5.3 Flora**

Land use data for the project area was obtained primarily using the MLCCS, which is available for DNR-owned lands such as Wildlife Management Areas.

Flora that the 230 kV transmission lines will cross are likely black spruce swamp and emergent wetland vegetation. According to the Minnesota's Native Vegetation: A Key to Natural Communities, a black spruce swamp canopy is typically dominated by black spruce, tamarack, and white cedar. The ground layer is dominated by sedges (*Carex spp.*), cotton-grasses (*Eriophorum spp.*), and ericaceous shrubs (Labrador tea, bog-rosemary, swamp laurel, creeping snowberry), with a moss layer dominated by feather mosses that may be mixed with *Sphagnum spp.* Approximately 210 feet to the west of the proposed transmission line, across TH 72, the vegetation shifts to an open bog. Open bogs typically have less tree cover but typically have many of the ground layer species in a black spruce swamp. In addition, species such as sundew (*Drosera rotundifolia*) and pitcher plant (*Sarracenia purpurea*) are characteristic of this community. Open bogs also typically have a continuous mat of sphagnum mosses, usually dominated by *Sphagnum magellanicum* or *S. angustifolium*.

The 69 kV transmission line will follow the existing transmission corridor that is adjacent to several plant communities. These communities include grasslands, emergent wetland vegetation, and black spruce bog. The line will cross areas classified as grassland and artificial surfaces. The grassland is described in the MLCCS as an area with mature grasses less than one meter high. Artificial areas are identified as areas where human activities, such as construction, have created artificial surfaces such as concrete, asphalt, gravel, etc. From the land use patterns in the area, the line will also likely cross an area that has emergent vegetation (Cowardin Classification L2EM2H). These types of emergent wetlands are lacustrine systems with non-persistent vegetation that are covered with water throughout the year.

The new Lund Substation will be constructed on fallow agricultural land. Following discussions with local regulatory individuals, the vegetation at the substation site may have reverted to wetland vegetation. Impacts to wetlands are discussed in Section 4.5.2.1.

#### ***4.5.3.1 Potential Impacts***

Impacts associated with the 69 kV line are expected to be minimal. The existing ROW will be used for the new double circuit line. A few trees may be cleared during construction of the 0.1 miles of fiber optic line that heads north from the existing ROW to the radio tower.

The substation will not displace vegetation in a native plant community. The land is currently fallow and was used for agriculture in the past. There is a possibility that the site has reverted to wetland vegetation in which case approx. 3.6 acres of vegetation may be impacted.

The 230 kV transmission lines will cause a permanent impact to vegetation of approximately 0.02 acres. Temporary impacts will be approximately 1.9 acres during construction of the line. As stated previously, vegetation, such as trees, will be removed that could potentially impact the safe operation of the line (Appendix B.12).

#### ***4.5.3.2 Mitigative Measures***

Minnkota will use water and soil conservations practices such as containing excavated material, protecting exposed soil, and stabilizing restored soil for the Project. To minimize impacts to vegetation along the 69 kV route and the fiber optic line, Minnkota will remain on their ROW during construction, except for the section of fiber optic line that heads north to the radio tower. To minimize temporary impacts Minnkota proposes to construct the 230 kV transmission lines during the winter and utilize existing ROW when possible. Tree removal will be minimized to the extent practicable.

### **4.5.4 Fauna**

The Carp Swamp WMA provides habitat for many animal species. Animals typically found in bog and peatland areas include shrews, voles, bog lemmings, and red squirrels. Bird species that prefer bogs include warblers, sparrows, hermit thrushes, yellow-bellied flycatchers, and dark-eyed juncos. Amphibians and reptiles are uncommon in these areas.

A list of mammals, birds, and amphibians that have been previously identified in the County is in Appendix D.

#### ***4.5.4.1 Potential Impacts***

There is a potential for temporary displacement of wildlife during construction and loss of small amounts of habitat from the Project due to pole placement. The Carp Swamp WMA is bog habitat approximately 14,000 acres in size. If animals are displaced, they are likely displaced a

short distance in the short term. Following construction, impacts to wildlife may occur due to collisions with the transmission line structures. Raptors, waterfowl, and other bird species are commonly affected by the construction and placement of transmission lines. Avian collisions are a possibility after completion of the transmission line. Waterfowl are typically more susceptible to transmission line collision, especially if the line is placed between agricultural fields that serve as feeding areas, or between wetlands which serve as resting areas.

Additionally, electrocution of large birds, such as raptors, is a concern related to distribution lines. Electrocution occurs when birds with a large wingspan come in contact with either two conductors, or a conductor and a grounding device. Common birds, such as crows, ravens, and sparrows, occasionally nest in substation areas and could potentially be electrocuted.

#### ***4.5.4.2 Mitigative Measures***

Minnkota will utilize transmission designs that minimize impacts to raptors and other birds that are at risk for electrocution if proper design standards are not implemented. A fence will be installed surrounding the substation, minimizing wildlife access. Permanent impacts to other fauna in the project area are not anticipated; therefore additional mitigative measures are unnecessary.

## **4.6 RARE AND UNIQUE NATURAL RESOURCES**

On January 19, 2005, Minnkota requested the DNR review of the Project for possible effects to threatened and endangered species and rare natural features within the Project area. On February 1, 2005, the DNR replied identifying one known occurrence within a one-mile radius of the Project. The record is a short eared owl (*Asio flammeus*) a species of special concern. Although this species is not endangered or threatened, it is extremely uncommon in Minnesota, or has unique or highly specific habitat requirements and deserves careful monitoring of its status.

### **4.6.1 Potential Impacts**

Based on the letter from the DNR and discussions with the DNR Area Wildlife Manager, no impacts to this species is anticipated.

### **4.6.2 Mitigative Measures**

Since no impacts are anticipated, no mitigation is necessary.

## **5.0 AGENCY INVOLVEMENT, IDENTIFICATION OF LANDOWNERS AND REQUIRED PERMITS AND APPROVALS**

### **5.1 AGENCY CONTACTS**

#### **5.1.1 Minnesota Department of Natural Resources**

The DNR Natural Heritage and Non-game Research Program was contacted on January 19, 2005, to review the Project area for State threatened and endangered species, and rare natural features (Appendix C.3). In the DNR's response, received February 14, 2005 one rare species or natural community was identified within a one-mile radius of the project (Appendix C.4). However Sara Hoffman, on behalf of the DNR, stated that, based on the nature and location of the Project, the rare species, a short eared owl, will not be affected. Ms. Hoffman also recommended the DNR Area Wildlife Manager be contacted. A discussion with Mr. Jeff Dittrich indicated he believed the project would not increase harm to wildlife in the area.

#### **5.1.2 Minnesota SHPO**

Minnkota contacted the Minnesota State Historic Preservation Office (SHPO) on January 19, 2005, to review the project Area of Potential Effects (APE) for the presence of known or suspected properties that may be eligible for listing on the National Register of Historic Places (NRHP) (Appendix C.1). The SHPO responded on February 17 and stated that no NRHP-listed or eligible properties were likely to be within the project's APE (Appendix C.2).

#### **5.1.3 NRCS**

A letter was sent to the Baudette Field Office of the NRCS on January 19, 2005 (Appendix C.5). No formal response was received. During a phone conversation on February 23, 2005, no issues were identified. Based on the soil survey provided by the NRCS, no prime farmlands were identified. Therefore, the completion of a Farmland Conversion Impact Rating Form (AD-1006) is not required.

#### **5.1.4 USFWS**

The USFWS Twin Cities Ecological Field Office was contacted January 19, 2005, to review the Project area for federally-listed threatened and endangered species (Appendix C.6). HDR contacted the USFWS again on February 17, 2005 via phone to request comments on the project. HDR sent an email message to Paul Burke, and stated that the Project will have no effect on threatened and endangered species in the Project area and asked for the USFWS' concurrence. In response, Mr. Burke, on behalf of the USFWS, stated that they concur with the determination

that the proposed action will have no effect on federally-listed threatened or endangered species. The USFWS asked to be contacted if new information becomes available that indicates listed species may be affected (Appendix C.7).

### 5.1.5 COE

A letter was sent to Ms. Kelly Urbanek on January 19, 2005 (Appendix C.8). No formal response was received. During a phone conversation on February 23, 2005, Ms. Urbanek identified her concerns related to wetland impacts at the substation location and along the transmission line corridors. She recommended speaking to the LGU (Lake of the Woods County) and coordinate a meeting closer to the growing season for a field review of potential wetland impacts. An additional conversation on March 2, 2005 addressed issues related to permit timing and approach.

### 5.1.6 LGU – Lake of the Woods County

On February 23, 2005, Mr. Josh Stromlund, the Land and Water Planning Director for Lake of the Woods County was contacted by phone as requested by the COE. Mr. Stromlund indicated that the substation site in question has possibly reverted back to a wetland state. He also encouraged Minnkota to coordinate a meeting closer to the growing season to field review potential impacts. An additional conversation with Mr. Stromlund on March 2, 2005 addressed mitigation options and issues related to permit timing and approach.

## 5.2 IDENTIFICATION OF LAND OWNERS

Landowner names are provided in Table 14 below. There are nine landowners along the 230 kV and 69 kV routes and on the substation property.

**Table 14**  
**Landowner Names**

Company	First Name	Last Name
City of Baudette		
Lake of the Woods County		
Department of Natural Resources		
Erickson Timber	Wayne	Erickson
	Norman	Johnson
	Dale	Erickson
	Donavon	Smith
	Jacquelyn	Paschke
	Clara	Locascio

### 5.3 REQUIRED PERMITS AND APPROVALS

Table 15 shows the permits potentially required for the Project.

**Table 15**  
**Potential Required Permits**

Permit	Jurisdiction
<b>Local Approvals</b>	
Road Crossing Permits	Lake of the Woods County
Lands Permit	Lake of the Woods County
Building Permits	Lake of the Woods County
Over-width Loads Permits	Lake of the Woods County
Driveway/Access Permits	Lake of the Woods County
<b>State of Minnesota Approvals</b>	
Route Permit (Alternative Process)	EQB
Section 401 Certification	MPCA
Wetland Conservation Act/Permit Application for Public Utility Projects	DNR, LGU (Lake of the Woods County)
NPDES Permit	MPCA
Utility Permit	Mn/DOT
Drainage Permit	Mn/DOT
Access Driveway permit	Mn/DOT
License to Cross Public Lands	DNR
<b>Federal Approvals</b>	
RUS Environmental Report	Rural Utilities Service
Section 404 Permit (GP/LOP-98-MN)	U.S. Army Corps of Engineers
Section 106 Review	Lead Federal Agency
Section 7 Consultation	USFWS

#### 5.3.1 Local Approvals

Although obtaining local approvals is not required (Minn Stat. 116C.61), Minnkota will coordinate with the local governments in relation to the applicable local approvals.

### **5.3.2 State of Minnesota Approvals**

#### **Route Permit (Alternative Process)**

A HVTL cannot be constructed without a route permit approved by the EQB. A route permit under the Alternative Process requires the applicant to be eligible as outlined in Minnesota Rules 4400.2000.

#### **Section 401 Certification**

A Section 401 Water Quality Certification from the MPCA is required when federal approval for the project is obtained.

#### **Wetland Conservation Act**

The Wetland Conservation Act (WCA) requires anyone proposing to drain, fill, or excavate a wetland to avoid, minimize and replace wetland acres, functions, and values. Following a wetland delineation, the wetland impacts will be determined and Minnkota will work with the LGU and the DNR to address the impacts. A permit application for public utility projects will be completed. This permit will be acquired prior to project construction.

#### **NPDES Permit**

A National Pollutant Discharge Elimination System (NPDES) permit is required for stormwater discharges associated with construction activities disturbing soil equal to or greater than one acre in area. A requirement of the permit is to develop and implement a Stormwater Pollution Prevention Plan (SWPPP), which includes BMPs to minimize discharge of pollutants from the site. This permit will be acquired since the substation work impacts more than one acre.

#### **Utility Permit**

A permit from the Mn/DOT is required for construction, placement, or maintenance of utility lines to be placed adjacent or across the highway ROW. These permits will be acquired once the line design is complete.

#### **Drainage Permit**

A permit from the Mn/DOT is required to connect a natural drainage, drain or ditch to a highway drain or ditch. This permit will be obtained prior to construction.

**Access Driveway Permit**

A permit from the Mn/DOT is required for driveway access to a highway. This permit will be obtained prior to construction.

**License to Cross Public Lands**

Minnesota Statute 84.415 requires that a license be obtained from the Department of Natural Resources for the passage of any utility over, under or across any state land or public waters. Minnkota has previously acquired this permit for the existing 69 kV transmission line right of way. An additional permit will be needed for the fiber optic line.

**5.3.3 Federal Approvals****RUS Environmental Report**

As the Rural Utilities Services (RUS) is providing funding for this project an environmental report will be submitted for review by RUS. The report required by RUS is being prepared concurrent with this application.

**Corps of Engineers Permit**

The U.S. Army Corps of Engineers has regulatory authority over waters of the United States. Under Section 404 of the Clean Water Act the Corps has the authority to regulate the discharge of dredged or fill material into waters of the United States. If the wetlands within the project area are considered jurisdictional, then a permit application for public utility projects will be completed. A GP/LOP permit, if applicable, will be acquired prior to project construction.

**Section 106 Review**

Because the proposed project will receive funding assistance from the Rural Utility Service, the project is considered a federal undertaking. The Rural Utility Service, as a federal sponsor, is required to comply with Section 106 of the National Historic Preservation Act of 1966 (as amended) (Section 106) for this undertaking. Section 106 tasks RUS to consider, in consultation with Minnesota State Historic Preservation Office (SHPO) and appropriate Tribal governments, the impacts of the undertaking on significant cultural resources. Minnkota has contacted the SHPO and the Red Lake Band of Chippewa (Minnesota) and the Turtle Mountain Chippewa and will consider their recommendations in consultation with the RUS. The project will strive to avoid impacts to significant cultural resources or, if they are unavoidable, work through the RUS, SHPO and the Tribes to mitigate adverse effects to these resources.

## **6.0 SUMMARY OF FACTORS TO BE CONSIDERED**

In determining whether to issue a permit for a high voltage transmission line, the EQB considers 14 factors, which are listed in Minnesota Rule 4400.3150. A discussion of each of the relevant factors as they relate to the Project is provided below.

### **6.1 EFFECTS ON HUMAN SETTLEMENT AND AESTHETICS, INCLUDING BUT NOT LIMITED TO, DISPLACEMENT, NOISE, AESTHETICS, CULTURAL VALUES, RECREATION, AND PUBLIC SERVICES**

The proposed route will result in no displacement of existing homes or businesses. The noise related to the proposed line and substation will be minimal, as described in Section 4.2.3. The impacts associated with aesthetics and recreation will be minor. The Project will have no impact on cultural values or public services within the Project corridor.

### **6.2 EFFECTS ON PUBLIC HEALTH AND SAFETY**

No effects on public health and safety are anticipated. The proposed line will be constructed to comply with NESC, RUS, and Minnkota guidelines. EMF levels were modeled for the 230 kV and 69 kV lines and are presented in Section 3.5.

### **6.3 EFFECTS ON LAND-BASED ECONOMIES, INCLUDING, BUT NOT LIMITED TO, AGRICULTURE, FORESTRY, TOURISM, AND MINING**

No effects to agriculture, forestry, tourism, or active sand and gravel mining operations will occur.

### **6.4 EFFECTS ON ARCHAEOLOGICAL AND HISTORIC RESOURCES**

The proposed route is not expected to impact any archaeological sites or historic standing structures.

### **6.5 EFFECTS ON THE NATURAL ENVIRONMENT, INCLUDING EFFECTS ON AIR AND WATER QUALITY RESOURCES, AND FLORA AND FAUNA**

No air quality impacts are anticipated. Impacts to water quality are primarily associated with soil disturbance during construction. Impacts to wetlands are anticipated. To minimize impacts, construction of the transmission line will occur during the winter months. Minnkota will work with the COE, LGU, and DNR to address wetland impacts. The extent of the impact will not be known until final design is complete and a wetland delineation is approved.

Permanent impacts to flora will occur. Trees will need to be removed, but only trees that are located within the ROW or would interfere with the safe and reliable operation of the line will be removed. Fauna may be temporarily displaced during construction and some organisms may be displaced due to the loss of habitat. No permanent impacts to fauna are anticipated.

## **6.6 EFFECTS ON RARE AND UNIQUE NATURAL RESOURCES**

No effects to known rare and unique natural resources will occur.

## **6.7 APPLICATION OF DESIGN OPTIONS THAT MAXIMIZE ENERGY EFFICIENCIES, MITIGATE ADVERSE ENVIRONMENTAL EFFECTS, AND COULD ACCOMMODATE EXPANSION OF TRANSMISSION CAPACITY**

Currently there is no foreseeable need to accommodate expansion of the transmission lines. The substation will be designed to accommodate future expansion, should the need arise.

## **6.8 USE OR PARALLELING OF EXISTING RIGHTS-OF-WAY, SURVEY LINES, NATURAL DIVISION LINES, AND AGRICULTURAL FIELD BOUNDARIES**

Approximately 94% of the Project length parallels or uses existing transmission or highway ROW.

## **6.9 USE OF EXISTING LARGE ELECTRIC POWER GENERATING PLANT SITE**

This factor is not applicable to the Project.

## **6.10 USE OF EXISTING TRANSPORTATION, PIPELINE, AND ELECTRICAL TRANSMISSION SYSTEMS OR RIGHTS-OF-WAY**

Existing 69 kV ROW will be utilized for the project as described in Section 3.2.3.

## **6.11 ELECTRICAL SYSTEM RELIABILITY**

The project is necessary to meet the needs of member distribution cooperatives. Minnkota needs these facilities to reliably serve the electric load in the region, as described in Section 2.1.

## **6.12 COSTS OF CONSTRUCTING, OPERATING AND MAINTAINING THE FACILITY WHICH ARE DEPENDENT ON DESIGN AND ROUTE**

This factor is not applicable to the Project because only one route is proposed.

### **6.13 ADVERSE HUMAN AND NATURAL ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED**

Adverse human and natural environmental effects which cannot be avoided include visual impacts associated with the project as well as those impacts related to the placement and use of the land within the site.

### **6.14 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES**

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the use of these resources have on future generations. Irreversible effects primarily result from use or destruction of a specific resource that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action. There are few commitments of resources associated with this project that are irreversible and irretrievable, but include those resources primarily related to construction.

Construction resources that will be used include concrete, steel, and hydrocarbon fuel. These resources will be utilized to construct the project. The substation will require steel and concrete for the equipment. During construction vehicles will be traveling to and from the site, utilizing hydrocarbon fuels.

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## **8.0 DEFINITIONS**

<b>Avian</b>	Of or relating to birds.
<b>Conductor</b>	A material or object that permits an electric current to flow easily.
<b>Corona</b>	The breakdown or ionization of air in a few centimeters or less immediately surrounding conductors.
<b>Fauna</b>	The collective animals of any place or time that live in mutual association.
<b>Flora</b>	The collective plants of any place or time that live in mutual association.
<b>Hydrocarbons</b>	Compounds that contain carbon and hydrogen, found in fossil fuels.
<b>Ionization</b>	Removal of an electron from an atom or molecule.
<b>Oxide</b>	A compound of oxygen with one other more positive element or radical.
<b>Ozone</b>	A form of oxygen in which the molecule is made of three atoms instead of the usual two.
<b>pH</b>	A unit for measuring hydrogen ion concentrations. A pH of 7 indicates a "neutral" water or solution. At pH lower than 7, a solution is acidic. At pH higher than 7, a solution is alkaline.
<b>Raptor</b>	A member of the order Falconiformes, which contains the diurnal birds of prey, such as the hawks, harriers, eagles and falcons.
<b>Ultraviolet radiation</b>	A portion of the electromagnetic spectrum with wavelengths shorter than visible light.
<b>Voltage</b>	Electric potential or potential difference expressed in volts.
<b>Wetland</b>	Wetlands are areas that are periodically or permanently inundated by surface or ground water and support vegetation adapted for life in saturated soil. Wetlands include swamps, marshes, bogs and similar areas.

**Appendix A**

**Notice to the EQB**

## **Appendix B**

### **Project Maps**

**Appendix C**  
**Agency Letters**

## **Appendix D**

### **Fauna List**

### Avian Species

Common Name	Scientific Name
Mallard	<i>Anas platyrhynchos</i>
Common Merganser	<i>Mergus merganser</i>
Ruffed Grouse	<i>Bonasa umbellus</i>
Sharp-tailed Grouse	<i>Tympanuchus phasianellus</i>
Bald Eagle	<i>Haliaeetus leucocephalus</i>
Northern Harrier	<i>Circus cyaneus</i>
Northern Goshawk	<i>Accipiter gentilis</i>
Red-tailed Hawk	<i>Buteo jamaicensis</i>
Rough-legged Hawk	<i>Buteo lagopus</i>
Merlin	<i>Falco columbarius</i>
Gyr Falcon	<i>Falco rusticolus</i>
Rock Pigeon	<i>Columba livia</i>
Great Horned Owl	<i>Bubo virginianus</i>
Snowy Owl	<i>Nyctea scandiaca</i>
Northern Hawk Owl	<i>Surnia ulula</i>
Barred Owl	<i>Strix varia</i>
Great Gray Owl	<i>Strix nebulosa</i>
Downy Woodpecker	<i>Picoides pubescens</i>
Hairy Woodpecker	<i>Picoides villosus</i>
Black-backed Woodpecker	<i>Picoides arcticus</i>
Pileated Woodpecker	<i>Drycopus pileatus</i>
Northern Shrike	<i>Lanius excubitor</i>
Gray Jay	<i>Perisoreus canadensis</i>
Blue Jay	<i>Cyanocitta cristata</i>
Black-billed Magpie	<i>Pica hudsonia</i>
American Crow	<i>Corvus brachyrhynchos</i>
Common Raven	<i>Corvus corax</i>
Black-capped Chickadee	<i>Poecile atricapilla</i>
Boreal Chickadee	<i>Poecile hudsonica</i>
Red-breasted Nuthatch	<i>Sitta canadensis</i>
White-breasted Nuthatch	<i>Sitta carolinensis</i>
Brown Creeper	<i>Certhia americana</i>
Brown Thrasher	<i>Toxostoma rufum</i>
European Starling	<i>Sturnus vulgaris</i>
Bohemian Waxwing	<i>Bombycilla garrulus</i>
American Tree Sparrow	<i>Spizella arborea</i>
Song Sparrow	<i>Melospiza melodia</i>
White-throated Sparrow	<i>Zonotrichia albicollis</i>
Dark-eyed Junco	<i>Junco hyemalis</i>
Lapland Longspur	<i>Calcarius lapponicus</i>
Snow Bunting	<i>Plectrophenax nivalis</i>

Common Name	Scientific Name
Red-winged Blackbird	<i>Agelaius phoeniceus</i>
Rusty Blackbird	<i>Euphagus carolinus</i>
Brewers Blackbird	<i>Euphagus cyanocephalus</i>
Common Grackle	<i>Quiscalus quiscula</i>
Pine Grosbeak	<i>Pinicola enucleator</i>
Purple Finch	<i>Carpodacus purpureus</i>
White-winged Crossbill	<i>Loxia leucoptera</i>
Common Redpoll	<i>Carduelis flammea</i>
Hoary Redpoll	<i>Carduelis hornemanni</i>
Pine Siskin	<i>Carduelis pinus</i>
American Goldfinch	<i>Carduelis tristis</i>
Evening Grosbeak	<i>Coccothraustes vespertinus</i>
House Sparrow	<i>Passer domesticus</i>

### Mammal Species

Common Name	Scientific Name
Masked Shrew	<i>Sorex cinereus</i>
Pygmy Shrew	<i>Sorex hoyi</i>
Short-tailed Shrew	<i>Blarina brevicauda</i>
Short-tailed Weasel	<i>Mustela erminea</i>
Least Weasel	<i>Mustela nivalis</i>
Long-tailed Weasel	<i>Mustela frenata</i>
Striped Skunk	<i>Mephitis mephitis</i>
Coyote	<i>Canis latrans</i>
Gray Wolf	<i>Canis lupus</i>
Woodchuck	<i>Marmota monax</i>
Thirteen-lined Ground Squirrel	<i>Spermophilus tridecemlineatus</i>
Franklin's Ground Squirrel	<i>Spermophilus franklinii</i>
Eastern Chipmunk	<i>Tamias striatus</i>
Least Chipmunk	<i>Eutamias minimus</i>
Red Squirrel	<i>Tamiasciurus hudsonicus</i>
Northern Flying Squirrel	<i>Glaucomys sabrinus</i>
Deer Mouse	<i>Peromyscus maniculatus</i>
Southern Bog Lemming	<i>Synaptomys cooperi</i>
Northern Bog Lemming	<i>Synaptomys borealis</i>
Gapper's Red-backed Vole	<i>Clethrionomys gapperi</i>
Meadow Vole	<i>Microtus pennsylvanicus</i>
Meadow Jumping Mouse	<i>Zapus hudsonius</i>
Porcupine	<i>Erethizon dorsatum</i>

**Reptile and Amphibian Species**

Common Name	Scientific Name
Western Painted Turtle	<i>Chrysemys picta belli</i>
Canadian Toad	<i>Bufo hemiophrys</i>
American Toad	<i>Bufo americanus</i>